In the claims

Please cancel claims 41-93 without prejudice.
Upon cancellation of claims 41-93 the pending claims will read as follows:

This listing of claims will replace all prior versions, and listings, of claims in the application.
Upon entry of the present amendment, the claims will stand as follows:

1. (Original) A solid gel matrix comprising a solid gel and one or more SERS-enhancing nanoparticles with an attached probe that binds specifically to an analyte.

2. (Original) The gel matrix of claim 1 comprising a plurality of the nanoparticles to provide a plurality of unique optical signatures.

3. (Original) The gel matrix of claim 2, wherein the SERS-enhancing nanoparticles comprise one or more Raman-active tags independently selected from the group consisting of nucleic acids, nucleotides, nucleotide analogs, base analogs, fluorescent dyes, peptides, amino acids, modified amino acids, organic moieties, quantum dots, carbon nanotubes, fullerenes, metal nanoparticles, electron dense particles and crystalline particles.

4. (Original) The gel matrix of claim 1, wherein at least one of the nanoparticles has a net charge.

5. (Original) The gel matrix of claim 1, wherein the nanoparticles each provide a unique SERS-signal that is correlated with binding specificity of the probe of the nanoparticle.

6. (Original) The gel matrix of claim 1, wherein the Raman-active tag comprises adenine or an analog thereof.

7. (Original) The gel matrix of claim 1, wherein the nanoparticles are composite organic-inorganic nanoparticle (COINs) comprising a core and a surface, wherein the core comprises a metallic colloid comprising a first metal and a Raman-active organic compound.

8. (Original) The gel matrix of claim 7, wherein the COINs further comprise a second metal different from the first metal forming a layer overlying the surface of the nanoparticle.

9. (Original) The gel matrix of claim 8, wherein the COINs further comprise an organic layer overlying the metal layer, which organic layer comprises the probe.

10. (Original) The gel matrix of claim 1, wherein the probe is selected from antibodies, antigens, polynucleotides, oligonucleotides, receptors and ligands.

11. The gel matrix of claim 10, wherein the probe comprises a polynucleotide.

12. (Original) The gel matrix of claim 1, wherein at least some of the nanoparticles further comprise a fluorescent label that contributes to the optical signature.

13. (Original) A method for producing a gel matrix comprising:

a) forming a liquid composition by mixing together

a gel-forming liquid comprising gel-forming particles in a suitable liquid; and

a plurality of Raman-enhancing nanoparticles having a plurality of unique optical signatures, and an attached probe for binding to an analyte; and

b) obtaining a solid gel matrix from the liquid composition.

14. (Original) The method of claim 13, wherein the gel matrix comprises a plurality of the SERS-enhancing nanoparticles, each having an attached probe that binds specifically to a known analyte to form a complex.

15. (Original) The method of claim 14 wherein the SERS-enhancing nanoparticles are COINs.

16. (Original) A method for detecting an analyte in a sample comprising:

contacting a sample containing a analyte with a gel matrix of claim 1 under conditions allowing binding of the probe to the analyte to form a complex;

separating the complex from other sample contents by electrophoresis or magnetophoresis; and

detecting SERS signals emitted by complexes separated at various locations within the gel, wherein a SERS signal emitted by a particular complex is associated with the presence of a particular analyte.

17. (Original) The method of claim 16, wherein the gel matrix comprises two or more of the complexes and the signals from the two or more complexes are indicative of the presence of two or more different analytes.

18. (Original) The method of claim 16, wherein the SERS signal from a particular complex provides information regarding the chemical structure of the analyte.

19. (Original) The method of claim 18, wherein the gel matrix is a polyacrylamide gel and the analytes are selected from antigens, polypeptides, proteins, glycoproteins, lipoproteins, and combinations thereof.

20. (Original) The method of claim 16, wherein at least two of the nanoparticles are metal-containing SERS-enhancing nanoparticles having different net charges.

21. (Original) The method of claim 20, wherein the SERS-enhancing nanoparticles are COINs.

22. (Original) The method of claim 16, wherein the analyte is contained in a biological sample.

23. (Original) The method of claim 16, wherein the associating comprises determining a mobility change caused by binding of the probe to the analyte.

24. (Original) The method of claim 16, wherein the separating comprises electrophoresis.

25. (Original) The method of claim 16, wherein the method further comprising subjecting the analyte to chromatography or isoelectric focusing prior to or following the detecting.

26. (Original) The method claim 24, wherein the electrophoresis is one dimensional or two-dimensional electrophoresis under non-denatured conditions.

27. (Original) The method of claim 16, wherein the method further comprises soaking the gel in a chemical enhancer solution and drying the gel to concentrate the samples prior to the detecting.

28. (Original) The method of claim 16, wherein the sample comprises one or more additional analytes having substantially the same size and/or same charge density and said method comprises associating the optical signals with the identity of the at least one analyte based on altered mobility of the complex in the gel as compared with that of the additional analytes having substantially the same size and/or same charge density in the sample.

29. (Original) The method of claim 28, wherein the signals are SERS spectra and the spectra are compared with a SERS database containing SERS spectra of a plurality of analytes to identify bound analytes.

30. (Original) The method of claim 29, wherein the SERS spectra of one or more analytes in the sample are compared with a collection of SERS spectra to determine a difference, wherein the difference is associated with a known biological phenotype or disease.

31. (Original) The method of claim 16, wherein the sample is a body fluid.

32. (Original) The method of claim 31, wherein the sample is blood serum.

33. (Original) A system for detecting an analyte in a sample comprising:
a gel matrix of claim 1;
a sample containing at least one analyte; and
an optical detection system suitable for detecting SERS signals from the nanoparticles.

34. (Original) The system of claim 33, further comprising a computer comprising an algorithm for analysis of the SERS signals obtained from the sample.

35. (Original) A method for multiplex detection of target molecules in a sample, said method comprising:

contacting target molecules in a sample under conditions suitable to allow complex formation of analytes in the sample with a set of probe constructs, each construct comprising a non-nucleic acid probe conjugated with an optically-active nucleic acid barcode comprising at least one SERS-active nucleotide and having both a unique mobility in electrophoresis and a unique optical signature;

separating the complexes by electrophoresis;

detecting the unique optical signatures in a multiplex manner with a suitable detection device; and

associating individual optical signatures from the constructs with the identity of the corresponding analytes in the sample.

36. (Original) The method of claim 35, wherein the unique mobility results from the constructs in the set having varying number of nucleotides in the barcode.

37. (Original) The method of claim 35, wherein at least some of the constructs have a net charge.

38. (Original) The method of claim 35, further comprising separating free targets and/or free unbound probe constructs from the complexes by electrophoresis.

39. (Original) The method of claim 35, wherein the non-nucleic acid probes are antibodies that bind specifically to known protein-containing targets.

40. (Original) The method of claim 35, wherein the separated complexes are detected by optical techniques selected from adsorption, reflection, polarization, refraction, fluorescence, Raman spectra, SERS, resonance light scattering, grating-coupled surface plasmon resonance and combinations thereof.

Claims 41-93 canceled.